#10/Appeal Briefs
3/8/02



Sent to Addressee using Express Mailing Label No. EF296442855US on this 20 day of February, 2002.
Kent N. Stone
Kent N. Stone

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

| | |
|---|---|
| Applicant: | Donald L. Chubb et al. |
| Serial No.: | 09/323,650 Art Unit: 2859 |
| Filed: | June 1, 1999 |
| Title: | RARE EARTH OPTICAL TEMPERATURE SENSOR |
| Examiner: | Lydia M. De Jesus |
| Docket No.: | LEW 16,682-1 |



# APPELLANTS' BRIEF

Assistant Commissioner for Patents
Box: Appeal
Washington, D.C. 20231

Sir:

This is an ex parte appeal from the decision of the Examiner in the final rejection dated September 26, 2001 in the above-identified application, rejecting claims 1 - 17 in the application. This brief is accompanied by the requisite fee set forth in 37 CFR § 1.17(c). (Deposit Account charge is authorized on a PTO SB/17 form accompanying this Brief).



## REAL PARTY IN INTEREST:

The United States of America as represented by the Administrator of the National Aeronautics and Space Administration, Washington, DC (US) is the assignee of the application.

## RELATED APPEALS AND INTERFERENCES:

None.

## STATUS OF THE CLAIMS:

Claims 1 - 17 are appealed.

## STATUS OF AMENDMENTS:

No amendment was filed after final rejection.

## SUMMARY OF THE INVENTION:

The invention is an optical temperature sensor that includes an emitter 12, a light pipe 14, an optical bandpass filter 16 and a detector 18.

The emitter 12 emits energy in a selective energy emission band in response to the temperature of the emitter. The light 14 pipe has a first end communicating with the emitter 12 and the second end communicating with the filter 16. The filter 16 has a pass band within the selective energy band of the emitter 12. The detector 18, communicating with the filter 16, detects the emitted energy as a measure of temperature of the emitter 12.

The claimed combination achieves high accuracy temperature measurement by using an emitter 12 that emits energy in a selective energy emission band (page 3, lines 2 - 10). This enables the filter 16, working within the emission band, to pass a high proportion, if not most, of the emitted energy while readily blocking extraneous optical radiation energy (page 3, lines 18 - 22). Consequently, the detector 18 sees a relatively pure energy value or temperature signal coming from the emitter 12 (page 6, lines 12 - 14). Stated more simply, because the emitter 12 works at a particular band, the filter 16 is enabled to more readily pass all of what the emitter 12 emits and essentially only what the emitter 12 emits to produce an accurate temperature signal at the detector 18. The selective emitter/filter combination has the effect of substantially improving the signal to noise ratio in the sensor 10 (page 6, lines 14 - 16). Various materials are disclosed and claimed for the construction of the emitter 12, light pipe 14, and detector 18.

## ISSUES:

1) Whether claims 1 - 3, 5, 10 and 11 are unpatentable under 35 USC 102(b) as anticipated by Mihalczo et al. ("Mihalczo").

2) Whether claims 1 - 3, 10, and 16 - 17 are unpatentable under 35 USC 102(b) as anticipated by Tregay.

3) Whether claim 1 is unpatentable under 35 USC 102(b) as anticipated by Wissinger.

4) Whether claims 4, 7 - 9, and 13 - 17 are unpatentable under 35 USC 103(a) over Mihalczo in view of Milstein et al. ("Milstein").

5) Whether claim 11 is unpatentable under 35 USC 103(a) over Mihalczo in view of

Rusanov et al. ("Rusanov").

## GROUPING OF THE CLAIMS:

1) Claims 2, 3 and 5 do not fall with claim 1 under the first ground of rejection.

2) Claims 2 and 3 do not fall with claim 1 under the second ground of rejection.

## ARGUMENT:

1) Claim 1 defines an optical temperature sensor that comprises "an emitter having a selective energy emission band, said emitter converting thermal energy to energy within said emission band in response to a temperature of said emitter". At page 3, lines 2 - 5 and page 4, applicants give the response of energy emission or radiation "q" in a formula involving the emitter temperature T. Mihalczo does not show or suggest such an emitter. The emitter of Mihalczo responds not to its temperature but to the bombardment of it by neutrons (e.g. column 2, lines 60 - 62). See Shanklin Corp. v. Springfield Photo Mount Co., 521 F.2d 609, 187 U.S.P.Q. 129 (1st Cir. 1975) "To anticipate under section 102, a prior art reference must disclose all the elements of the claimed invention or their equivalents functioning in essentially the same way".

The sensor of claim 1, additionally, comprises "a detector communicating with said filter, said detector detecting said emitted energy as a measure of said temperature". Applicants' detector measures the temperature of the emitter by detecting the energy being emitted by the emitter. This detector structure and function is neither found nor suggested in Mihalczo. See

Shanklin Corp. v. Springfield Photo Mount Co., supra. In Mihalczo, the "decay [of light scintillation] is measured for temperature determination" (abstract and column 3, lines 24-31). The structure of Mihalczo cannot function to detect the energy being emitted to measure the temperature. The apparatus of Mihalczo, rather, must detect the rate of decay of scintillation which is not the same quantity as the energy being emitted. Decay time rate of scintillization measurement is not the same as detecting energy being emitted in response to the temperature of the emitter as a measure of emitter temperature. The statement of the Examiner (paragraph 9, page 7 of the final rejection, 09/26/01) establishes that the Mihalczo emitter is not responding to the temperature of the emitter as claimed by applicant but, rather, is responding to "absorption of thermal neutrons by the first phosphor" from the environment. That is to say, the first phosphor and, therefore, the alleged detector of Mihalczo, is not responding to its temperature as claimed by applicant but, rather, to neutron flux from the environment.

The Examiner's rejection ignores the claimed relationship between the emitter and detector wherein the temperature of the emitter is detected by the energy it emits which is a response to its temperature.

Claims 2, 3 and 5 recite specific emitter/material constructions that produce preferred spectral performance (page 3, lines 5 - 10) and are not anticipated by Mihalczo.

For the foregoing reasons, the rejection of claims 1 - 3, 5, 10 and 12 under 35 USC 102(b) in view of Mihalczo is in error.

2) Claim 1 includes the limitation, referred to above, of "an emitter having a selective energy emission band, said emitter converting thermal energy to energy within said emission band

in response to a temperature of said emitter". The specification gives specific examples of emitters that produce this effect (page 3, line 2 - 10). There is no showing or suggestion in Tregay of an emitter that produces energy within a selective energy emission band. See Gillette Co. v. Warner-Lambert Co., 690 F. Supp. 115, 117, 8 U.S.P.Q.2d 1082, 1084 (D. Mass. 1988) where it was held to find anticipation "Not only must all claimed elements be present in the prior device, but the elements must be found in substantially the same situation where they do substantially the same work." The alleged emitter of Tregay is a roughened optical fiber or refractory element or compound exemplified by oxides of aluminum, silicon, zirconium and yttrium (column 5, lines 10-18) and does not have a selective energy emission band. Yttrium is not a rare earth element.

Claims 2 and 3 recite specific emitter/material constructions that produce preferred spectral performance and such constructions are not found in Tregay.

For the foregoing reasons, the rejection of claims 1 - 3, 10 and 16 - 17 under 35 USC 102(b) in view of Tregay is in error.

3) Claim 1 defines the temperature sensor as comprising "an emitter having a selective energy emission band, said emitter converting thermal energy to energy within said emission band in response to a temperature of said emitter". No such structure or function is found or suggested in Wissinger. In Wissinger, the emitted energy is not responsive to the temperature of the diode, the alleged emitter, but, instead, is responsive to the voltage or electrical power supplied to the diode. In Wissinger, it is electrical power that is converted to optical energy. In Wissinger, thermal energy is not converted to optical emissions; thermal energy merely slightly

shifts the wavelength of the emitted energy. In Wissinger there is no converting of thermal energy to energy within a selective energy emission band. Stated otherwise, in Wissinger the conversion of energy is from electrical power to radiant or light energy; there is no described or actual substantive conversion of thermal energy to energy within an emission band. This is clear by simple reference to FIG. 2 of Wissinger where the laser diode 12 is operated by the power supply 32 (column 4, lines 15 - 17). Obviously the alleged emitter/diode is not converting thermal energy to optical energy and, in fact, the very basic attribute of a diode is to avoid thermal considerations in the generation of optical energy, as is well known and referenced at column 4, lines 24 - 27 of Wissinger. The Examiner's reliance on the statement at column 1, line 65 to column 2, line 3 is misplaced; there is no showing there, or elsewhere, "of conversion of thermal energy to energy within said emission band" - as alleged in the final rejection at page 3, section 4. The Examiner's statement (at page 8 of the final rejection) "... and hence, the emitter structures disclosed by Wissinger are converting thermal energy..." is unsupported by her, at best, strained analysis or by the actual physics involved. See, for example, *Ex parte* Standish, 10 USPQ2d 1454, 1457 (PTO Bd. Pat. App. & Int'f 1989) "anticipation of a claimed product cannot be predicated on mere conjecture as to the characteristics of a prior art product".

For all of the foregoing reasons, the rejection of claim 1 under 35 USC 102(b) over Wissinger is in error.

4) With reference to the rejection of claims 4, 7 - 9 and 13 - 17, applicants' arguments in paragraph 1 of this brief item are incorporated here.

Since Mihalczo fails to anticipate parent claim 1, these dependent claims are patentable

for that reason alone. See *In Re* Johnson, F.2d 1070, 200 USPQ 199 (CCPA 1978) "Since dependent claims, when properly drafted, are by nature less inclusive than their associated independent claims, and since we have found the independent claims to recite statutory processes under 35 USC 101, we reversed the board's holding as to claims 1 - 17...". There is no allegation that Milstein suggests a modification of Mihalczo that would render claim 1 obvious and, therefore, invalid over 35 USC 103(a).

There is no motivation found in either Mihalczo or Milstein to combine their teachings or, more particularly, to substitute the emitter of Milstein for the alleged emitter of Mihalczo. Milstein is concerned with converting thermal energy into light energy (e.g. column 4, lines 20 - 26) and gives no consideration or suggestion of temperature measurement - the subject of the present invention. Therefore, Milstein cannot provide any motivation for substituting their material for the alleged emitter of Mihalczo. See *In Re* Laskowski, 871 F.2d 115, 10 USPQ2d 1397 (Fed. Cir. 1989) "Although the Commissioner suggests that [the structure in the primary prior art reference] could be readily modified to form the [claimed] structure, '[t]he mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification.' " The essential feature of Mihalczo is a coating 12 that is a mixture of two phosphors - a neutron sensitive phosphor and a thermophosphor (column 2, lines 52 - 57) or a neutron sensitive thermophosphor (column 3, lines 59 - 62). Substitution of the emitter of Milstein, which is not a phosphor, i.e. not a scintillator, into the device of Mihalczo would render the Mihalczo device inoperative since there would be no decay of any scintillation by which temperature is to be measured.

For all of the foregoing reasons, the rejection of claims 4, 7 - 9 and 13 - 17 under 35 USC 103(a) as unpatentable over Mihalczo in view of Milstein is in error.

5) Regarding the rejection of claim 11 under 35 USC 103(a) over Mihalczo in view of Rusanov, applicants' incorporate their arguments made in paragraph 1 of this brief item. Since Mihalczo fails to anticipate claim 1, dependent claim 11 is patentable over the art of record. See *In Re* Johnson, supra. Moreover, claim 11 recites that the temperature sensor has a light pipe "composed of yttrium oxide". The fiber of Rusanov is alumina doped with a minuscule amount of yttrium oxide (column 3, lines 45 - 57) and there is no suggestion of its use in a temperature sensor as claimed by applicants.

For the foregoing reasons, the rejection of claim 11 under 35 USC 103(a) over Mihalczo in view of Rusanov is in error.

## CONCLUSION:

For all of the foregoing reasons, it is respectfully submitted that the presently claimed invention is neither anticipated nor obvious in light of the cited references. Reversal of the examiner's final rejection is requested.

If there are any further fees required by this communication, please charge the same to **Deposit Account No. 14-0116**.

Respectfully submitted,

NASA GLENN RESEARCH CENTER

By Kent N Stone

Kent N. Stone, Reg. No. 31,883

21000 Brookpark Road
Mail Stop 500-118
Cleveland, Ohio 44135
(216) 433-8855

Date: February 20, 2002

## APPENDIX A

1. An optical temperature sensor, said sensor comprising:

an emitter having a selective energy emission band, said emitter converting thermal energy to energy within said emission band in response to a temperature of said emitter;

a light pipe having a first end and a second end, said first end communicating with said emitter;

an optical bandpass filter communicating with said second end, said filter having a pass band within said emission band; and

a detector communicating with said filter, said detector detecting said emitted energy as a measure of said temperature.

2. An optical temperature sensor according to claim 1, wherein said emitter contains a rare earth element.

~~3. An optical temperature sensor according to claim 1, wherein said emitter is composed of a rare earth oxide.~~

4. An optical temperature sensor according to claim 1, wherein said emitter is composed of a rare earth aluminum garnet.

5. An optical temperature sensor according to claim 1, wherein said emitter is a high temperature host material which is doped with a rare earth element.

6. An optical temperature sensor according to claim 3, wherein said rare earth oxide is ytterbium oxide.

7. An optical temperature sensor according to claim 5, wherein said host material is yttrium aluminum garnet which is doped with a rare earth element.

8. An optical temperature sensor according to claim 7, wherein said dopant is ytterbium.

9. An optical temperature sensor according to claim 5, wherein said emitter is composed of yttrium oxide doped with ytterbium.

10. An optical temperature sensor according to claim 1, wherein said light pipe is composed of sapphire.

11. An optical temperature sensor according to claim 1, wherein said light pipe is composed of yttrium oxide.

12. An optical temperature sensor according to claim 1, wherein said light pipe is composed of quartz.

13. An optical temperature sensor according to claim 1, wherein said detector is a silicon detector.

14. An optical temperature sensor according to claim 1, wherein said detector is a lead sulfide detector.

15. An optical temperature sensor according to claim 1, wherein said detector is an indium antimonide detector.

16. An optical temperature sensor according to claim 1, wherein said sensor operates at temperatures above 2,000°K.

17. An optical temperature sensor according to claim 1, wherein said sensor operates at temperatures between 625°K and 2683°K.